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COMPREHENSIVE TEST BAN

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TIME FOR THE COMPREHENSIVE TEST BAN

We approve completely the President's decision of May 20 to seek to negotiate with the Soviet Union a five-year ban on any kind of underground nuclear test explosion. We commend the Soviet Union for finally agreeing to suspend its peaceful nuclear explosive program. We dispute the necessity, so deeply felt by the present leaders of our two weapon design laboratories, that the weapons laboratories must be kept open indefinitely (see p. 3).

The Comprehensive Test Ban is America's longest unfulfilled business in the arms race. It is the most dramatic symbol of the major powers' readiness to end the arms race. And, to a greater degree than is generally recognized, it may be, in the end, one of the most useful of arms control agreements.

Discussions on the importance of ending nuclear tests began in 1954, 24 year ago. In 1963, President Kennedy and Chairman Khruschev came within five "on-site" inspections of agreeing on a complete test ban, and agreed finally only on ending above ground nuclear tests. What might have happened had they agreed?

It is impossible to be sure. But a great deal of weapons development might not have occurred. The difficulty in developing anti-ballistic missile warheads might have made unnecessary the enormous time and energy required to end the ABM race. The development of MIRV would have been sharply inhibited since tests were required to develop the different shapes and sizes of warheads. The improvement of missile accuracy depending, in part, as it does, on improving the reentry coefficients of warheads might also have been inhibited. The neutron bomb affair would have been headed off and even the cruise missile development might have been slowed. Clearly, the existence and work of the weapon laboratories in both major powers have been key elements of the major power weapons acquisition process.

Today, we have much greater ability to detect Soviet underground nuclear tests than we would have had with ten times as many on-site inspections as the seven President Kennedy desired. We can be reasonably sure of detecting unilaterally — and identifying as an explosion — nuclear weapon tests of a few kilotons. Still smaller explosions might be picked up with seismographs. Furthermore, there are many other ways in which the U.S. might learn, through unilateral methods, of Soviet cheating: spies, defectors, picking up radio transmissions, observing preparations for tests, and all the rest. Thus, as in all enforcement schemes, evaders can be deterred by the fear of exposure from risking those lesser violations which, in principle, might evade any one detection scheme.

Supporting this arrangement is the lack of motivation for cheating. There is no decisive advantage to be gained by small kiloton shots. One cannot even thus verify that the larger warheads are still working (reliability testing). As one former head of a weapons laboratory noted within, the weapons laboratories are just "massaging details" nowadays. For the hawks, it should be noted that the cut-off of testing would leave the U.S. with far more tests.

Nevertheless, the ban on testing will represent a drag on the development of new variants of old weapons. The weapon laboratory leaderships see this clearly only in our case but argue that there is no U.S. interest in closing down the Soviet weapons laboratories! No clearer evidence exists of the institutional blindness of their position. With the weapons laboratories prohibited from testing in both superpowers, one can confidently expect that weapons design will wither and that the churning of weapons deployment will slow.

The laboratories argue that reliability testing will suffer. These arguments are most misleading as indicated on pages 3-6. Little reliability testing was ever done in the past and little is required in the future. Nothing much will happen over a five-year ban; certainly we will not become uncertain of the reliability of our weapons. And if both sides became somewhat unsure that these weapons would work over a longer term, it would assist deterrence, which requires far less certainty of detonation for its goal than aggression does for its.

In the longer run, a cut-off of testing may do more to curtail the arms race than major disarmament. Today disarmament feeds on stockpiles that are in enormous excess. But it seems increasingly unlikely that disarmament can be negotiated, in tense atmospheres, down to, through, and beyond that point at which deterrents are only barely sufficient. Instead, one can imagine futures in which nuclear weapons are considered quite irrelevant to the problems of the day, whether they be food, energy, climate, or whatever. And in such climates, nuclear warheads might be scavenged for fissionable material and nuclear delivery systems cutbacks encouraged for reasons of economy, or permitted to become obsolete without replacement out of sheer disinterest. □

—Reviewed and Approved by the FAS Council

THE NUCLEAR WEAPONS LABORATORIES AND THE UNIVERSITY OF CALIFORNIA

The United States has only two laboratories at which all U.S. nuclear weapons are designed — the Los Alamos Scientific Laboratory (LASL) and the Livermore Laboratory. Both are run under contract by the University of California. The nature of this contract has, for the second time in this decade, become an issue sufficient to induce the UC to produce a report on the propriety of the relationship between the University and the secret laboratories.

This report, named the Gerberding report for its Chairman William Gerberding, Chancellor of the University of Illinois at Urbana, says, in effect, that the University should take its formal responsibilities somewhat more seriously and, in particular, set up a Board of Overseers to keep a

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Richard — You may find this of interest.

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closer watch upon the laboratories. Whether and how the University shall follow the Gerberding recommendations is now being decided in Berkeley, where lectures and hearings on the report are underway.

Invited to give the opening address in this Berkeley lecture series on the arms race, FAS Director Stone journeyed en route to Los Alamos and to Livermore, and filed this report.

* * *

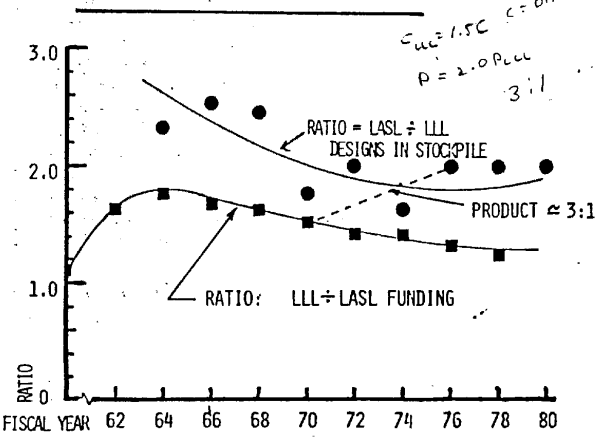
Los Alamos is not only the site of the atomic bomb development, but also the birthplace, in effect, of our own Federation of American Scientists, née the Federation of Atomic Scientists, which was then composed of constituent Associations of Atomic Scientists (e.g., Los Alamos, Brookhaven, Stanford, Oak Ridge, etc.).

Driving from Albuquerque for two hours past New Mexico scrub on a fast road, one gets no real sense of how isolated Los Alamos must have been 35 years before, when Robert Oppenheimer advised the Corps of Engineers to check out a boys' ranch he had seen once for a site for the secret laboratory. Traveling up to the mesa on a road winding up the canyon, the situation resembles a number of science fiction stories of isolated secret weapons research centers around which fate swirls. The secrecy was intense in those days, with code names for key physicists, personnel restricted to the vicinity, driving licenses and similar registrations made anonymously by number, and so on. The entire town was run as a closed city until 1957.

When the war ended, Dr. Oppenheimer quit as laboratory director. He and General Groves chose Norris Bradbury to be the next director. Dr. Bradbury served for a quarter century until 1970. What was this weapons laboratory director like?

Asked whether he had hoped, as Hans Bethe was said to have hoped, that the superbomb (the name then used for the H-bomb) would not be physically possible, he indicated that hopes were irrelevant. And he did not feel that Los Alamos had invented anything which, in due course, the Soviets would not have invented. But, in any case, in today's weapons research, he felt one could only "massage details." The "onus today" in the arms race was on delivery vehicles.

Bradbury was favorably inclined toward the Comprehensive Test Ban. Questioned about the need for "reliability testing," he almost snorted and asked if that was being used against the treaty. He said he thought reliability could be handled by other means.



LASL and LLL have been competing on nuclear weapons designs. A measure of success is the ratio of the number of designs in stockpile. The cost effectiveness is indicated by the ratio of designs in stockpile, multiplied by the funding ratio taken a few years back. This data suggests that it costs about three times as much to get a successful design from LLL as it does from LASL.

It turns out, other sources indicated to FAS, that reliability testing has never in fact been done by the weapons laboratory if one means by this that weapons are chosen randomly and tested for reliability. There are a few times, however, when weapons inspected for reliability were found to be "leaking" in some fashion and were tested to see if they would still work. This infrequent possibility is protected against by: (1) the fact that each arm of the triad has weapons of different design; (2) the fact that the treaty is of limited term; and (3) the fact that the treaty has abrogation clauses.

Dr. Bradbury thought it unlikely that the laboratory would ever produce a cheap bomb, and did not think the presence or absence of a Comprehensive Test Ban Treaty was too important. But he was concerned about disarmament and arms control. He would never have believed 30 years ago that the failure to achieve international control of the bomb would have been so complete, and he lectured students to get out there and do more.

The present director, Harold Agnew, is much less friendly to arms control. He affected not to know the difference between FAS and the Bulletin of Atomic Scientists and refers to them both with thinly veiled contempt (although he published from time to time in the Bulletin, evidently as a way of showing some kind of arms control credentials).

Asked if he were a proponent of the neutron bomb, Dr. Agnew said that, "Well, I told them that if this was what they wanted to do, then the neutron bomb was the way to do it." Could he then be considered a "weak proponent"? He muttered and gave no clear answer. Later, FAS discovered that he had advised the Joint Committee on Atomic Energy that:

> "I really don't know why people have not thought more on the use of these [deleted] weapons. It may be that people like to see tanks rolled over rather than just killing the occupants. . . . I know we at Los Alamos have a small, but very elite group that meets with outside people in the defense community and in the various think tanks. They are working very aggressively, trying to influence the DoD to consider using these [deleted] weapons which could be very decisive on a battlefield, yet would limit collateral damage that is usually associated with nuclear weapons." (April 16, 1973)

In short, Dr. Agnew was not only a strong proponent but the leader of an aggressive elite campaign lasting for years to promote the neutron bomb! Asked for articles, he limited himself to one of December, 1977 in the Bulletin which was a "Primer on Enhanced Radiation Weapons"; it concludes by affirming that Dr. Agnew "feels confident that had the facts been properly explained initially, even those who oppose nuclear weapons would have had to concur" that neutron bombs were better than pure fission bombs.

Dr. Agnew had no comment on the Gerberding report, saying that the UC Scientific Advisory Committee set up by an earlier Zinner Committee report was "serving its purpose" and was "pretty enthusiastic" about the lab.

His interest was engaged by my having unearthed his graph shown below. It reveals that Livermore gets 60% of the funding of the two labs for weapons but allegedly succeeds in getting fewer weapon designs into the stockpile. According to the graph, it costs Livermore three times as much to get a single warhead into the stockpile. The head of the Livermore weapons program subsequently denied this. (He says that the graph is an artifact of Los Alamos having gotten into the game earlier.) Apparently most of the strategic warheads have been done at Livermore and the tactical ones at Los Alamos. In order to spur competition, the Department of Energy is trying to get each laboratory to work on weapons of the other kind.

(See COMPREHENSIVE TEST BAN, Pg. 9-F)

COMPREHENSIVE TEST BAN -- CONTINUED

In general, the competition between the laboratories turned out to be intense and constant. The laboratory authorities see losses of contracts to the other laboratory as a requirement to cut personnel. Dr. Agnew has been at Los Alamos since it began. (Indeed, he sat in the tail of the plane that destroyed Hiroshima.) The town has only 20,000 people, of whom 6,000 work at the laboratory. One can imagine how painful it must be to fire employees under these circumstances.

For whatever reason, Dr. Agnew is firmly against the Comprehensive Test Ban. He argues that reliability testing and the health of the laboratory would suffer. He believes that every test ban treaty is really a threshold test ban treaty, since there is a limit beneath which one cannot identify tests, and that the threshold should be made explicit. Was there *any* value in the treaty, for example, in its closing down the Soviet weapons lab? He thought "not much." Certainly, he said, A CTBT should not occur before "a SALT." Asked what difference "a SALT" would make, he indicated the CTBT should not occur before a SALT treaty that made "a difference." Later an observer said he had had a similar conversation with Dr. Agnew and that Dr. Agnew seemed to believe that the complete Test Ban should occur only after general and complete disarmament — i.e., test ban last.

These impressions were supported by a letter written on April 19 to Congressman Jack Kemp, which said that in the absence of agreements for "meaningful reductions in our nuclear and conventional forces," he felt that "any restrictions" on nuclear testing would be to our disadvantage, including a threshold agreement. The key reason was that:

> "To me, the most significant aspect of continuing to test is the ability to maintain the nuclear weapon design and development capability on which much of our defense posture is now based." [Ed. Note: i.e., the health of the laboratory] (S11324)

This reasoning is simply irrelevant to any treaty (with the exception of general and complete disarmament).

Dr. Agnew conceded, however, in this same letter, that the "military significance to either the USSR or the USA of conducting clandestine tests below five or ten kilotons is *per se* of relatively little importance today" and that:

> "I expect that with ample money, no restrictions on materials, and adequate non-nuclear testing, the stockpile could be maintained as is for a period of *at least ten years.*" (italics added)

Ten years is twice the period of the proposed five-year Comprehensive Treaty.

The Los Alamos Laboratory began diversifying into energy and related nonweapon areas in 1970 and has about half of its work outside the weapons program. Dr. Robert D. Thorn, head of its weapons program, said that this "even helps the weapons program" by attracting persons who work on both sides of the divide. One of several reasons he gave against the Comprehensive Test Ban was that the Soviet Union might learn some new weapons effect that we would not. However, when later I asked if there was *anything* good about a test ban, e.g., was its shutting down the Soviet weapons laboratory useful, he said "no."

Dr. Thorn is a straightforward man, and well informed about weapons developments, but seemed less well informed about their strategic implications. For example, he termed MIRV the U.S. answer to Soviet throw-weight advantages, and thus did not seem to realize that MIRV both began, and is ending, as a counterforce weapon urged for reasons quite independent of Soviet throw weight.

The most interesting, and the shrewdest, person met at both laboratories was clearly the former Livermore director Michael May. A physicist born in France, he retains a slight French accent, a Cartesian approach, and a lucid and careful use of language. Like Dr. Agnew and Livermore director Baetzel, Dr. May opposes the test ban. He argues that it will do little to inhibit proliferation or reduce the U.S. arms competition, but will rather "introduce uncertainties in the performance and invulnerability of nuclear forces, forces which neither side can abandon at this time in history." (Interestingly, a number of laboratory people seem not even to have heard of the standard argument that, within limits, uncertainties about the effectiveness of weapons are likely to hinder surprise attacks — which have to go off precisely — without comparably undermining deterrence since no attacker can assume that the other side has weapons few of which will work.)

Dr. May portrays the laboratory's resistance to the test ban as a painful necessity rather than as a bureaucratic inevitability; the laboratory apparently felt obliged to tell the Joint Chiefs that it would resist a complete test ban the Chiefs were ready to buy.

Speaking informally around a table with Livermore personnel, the enthusiasm of the bomb designers surprised even Livermore colleagues who work in support capacities. One bomb designer even defended the Amchitka test — now widely considered to be the test of an obsolete warhead never to be used — on the ground that something can be learned from these experiments and the technology is important anyway. (These rank and file bomb designers also saw no advantage in closing the Soviet weapons laboratories.)

The Gerberding Report

At Berkeley, a small coalition of peaceniks is working to control the laboratories. In an earlier day, the key issue would have been secrecy at the University, and the proposed solution would have been divestiture. Today, the UC Nuclear Weapons Labs Conversion Project wants the University to convert the laboratories. The Conversion Project is sponsored by a group from the War Resisters' League/West. Charles Schwartz, often at the bottom of these "peace" insurrections is surprised at the resonance this issue has achieved.

The Conversion Project argues that the result of the weapons laboratory research and lobbying has been to accelerate the arms race and that the laboratory interests in creating "usable" warheads for limited nuclear war scenarios threatens, rather than strengthens, U.S. security. It believes that the passive manner of UC administration of the laboratory has resulted in protecting them from "needed public review." Charles Schwartz argues that the weapons labs are free of any UC supervision, and protected by UC nominal control from the supervision of any other body.

The Gerberding Conclusion

The eight-person Gerberding Report included an assistant director from each laboratory, the Berkeley student president, some UC professors and Herbert F. York, former FAS Chairman and former head of Livermore Laboratory. Presumably the committee would have split had the issue been divestiture. Under the present circumstances, however, it was able easily to unanimously recommend "continued management."

But a majority of the committee endorsed continuation only if certain changes are made. They include a board of overseers with trusteeship function which would constitute a subcommittee of the State Board of Regents. It would consist of regents, faculty, and others, meet twice a year at each laboratory and regularly issue a public report on its trusteeship. Rumor has it that Herbert York fashioned the solution.

Among the conclusions that might make some difference were these two:

(1) "that the board of overseers play a major role in the selection of the laboratory directors." At present, UC engages in a standard search procedure, but the candidate selected must be agreeable to the contractor, i.e., the Department of Energy. The way in which this arrangement

(See COMPREHENSIVE TEST BAN, Pg. 10-F)

COMPREHENSIVE TEST BAN -- CONTINUED

is carried out in practice might tilt the balance in choosing directors between those hostile to arms control and those with greater sympathy.

(2) "ensure that the programs and technical developments pursued at the laboratories be subjected to and based on critical analysis of their impact and consequences." This might force laboratories to think more about the results of their work.

Livermore, Conversion, and SPSE

At Livermore, unlike Los Alamos, there is a budding union called the Society for Professional Scientists and Engineers which contains one-fourth of all Livermore professionals. After initial skirmishes with the management — SPSE's first mailing disappeared from the Livermore post office and was burned at the local dump — the Society is now dealt with gingerly at the low level of the Assistant Director for Human Resources. SPSE complains there are no serious plans for conversion of the laboratory. It notes that in 1974, a Scientific Advisory Committee Report had urged the laboratory establish a "contingency planning group" in the Director's office of each laboratory which was designed to consider what might result from a "sudden shift in national policy to arms control measures that would seriously curtail weapons development." To the surprise of SPSE, FAS discovered that in 1977, the same Advisory Report said that both laboratories had "taken these responsibilities seriously and are thinking about contingency plans that would have to be invoked if a complete test ban treaty were negotiated."

The explanation surfaced in discussions with Dr. Harry Reynolds, who is head of the Livermore weapons program. Livermore does see the necessity for change in the face of a complete test ban, but it does not envisage any change from military to civilian programs — just a reorientation in precisely what the individuals working on bombs would do. Dr. Reynolds maintained that plans existed sufficient for this purpose. □

PANOFSKY TESTIMONY ON COMPREHENSIVE TEST BAN

The best statement on the Comprehensive Test Ban Treaty (CTBT) in Congressional hearings is excerpted below from the testimony of Wolfgang K. H. (Pefe) Panofsky from a Senate Foreign Relations Committee hearing on September 15, 1977 on the Threshold Test Ban Treaty (TTBT) and its accompanying Treaty on Peaceful Nuclear Explosions (PNEs). [The latter two treaties were signed by the United States and the Soviet Union and have been approved by the Senate Foreign Relations Committee but have not been taken up by the Senate and hence have never been ratified. But both are being complied with by both superpowers at this time. With the growing interest in the Comprehensive Test Ban Treaty, these two treaties have become increasingly anachronistic. The Soviet readiness to forgo PNEs for a time at least makes the Treaty on Peaceful Nuclear Explosions unnecessary. And the Threshold Test Ban Treaty, restricting tests underground only to 150 kilotons and below seems a level quite irrelevant (ten times the size of the Hiroshima bomb) and much inferior to a Comprehensive Test Ban Treaty if one can be negotiated.]

The LTBT has had one militarily very significant result and that is it has prevented complete tests of single or multiple nuclear explosions as they affect the resistance of hardened missile silos to nuclear attack.

Thus, the LTBT has made it more difficult for a military planner to gain the information required to destroy ICBM's in their silos with very few survivors left to retaliate. In this sense, the LTBT has contributed to the maintenance of Minuteman as a viable arm of the U.S. deterrent forces for a very long time to come.

Impact of Nuclear Test Restrictions

Most would agree that had we been able to reach agreement in 1963 on a comprehensive nuclear test ban treaty, adhered to by both the Soviet Union and the United States, and monitored by national means utilizing the detection and identification capabilities which an improved seismology and other surveillance technologies can provide, then U.S. national security would have been stronger today.

Nuclear weapons technology is a mature art, and therefore further nuclear weapons development may lead to some increases in efficiency or to adaptation to specialized missions, but is not apt to result in qualitatively new developments. Even numerical improvements in such quantities as yield to weight ratio are approaching a limit.

I would like to add here parenthetically that I consider the much discussed neutron bomb, the W-70 Mod. 3 warhead for the Lance system, to be in the category of a specialized adaptation rather than a substantial departure from the role of other tactical nuclear warheads.

The detailed performance of most weapons systems, both in strategic and tactical fields, is apt to depend much more strongly on the evolution of the nonnuclear components of the system, rather than on improved design of the nuclear warhead.

Accordingly, any nuclear test restrictions at this time are not likely to have a significant impact on the arms competition between the United States and the Soviet Union. However, the principal motivation for pursuing a comprehensive nuclear test ban treaty, or CTBT, relates to the issue of nuclear non-proliferation.

Here the linkage is both political and technical. By agreeing to the preamble of the NPT, and as a signatory to the Limited Nuclear Test Ban, this country has undertaken a solemn obligation to strive in good faith toward the attainment of a CTBT. The lack of progress on the part of the Soviet Union and the United States in reaching a CTBT has added to the cynicism with which the NPT is viewed by some nations and individuals. The cynicism would not be alleviated in itself, once this country has ratified the TTBT now before the Senate.

On the contrary, ratification of the Threshold Test Ban Treaty would actually be counterproductive to the cause of nonproliferation if it served to diminish the pressure toward attainment of a comprehensive ban.

Recommendation

My recommendation, therefore, is that the Senate ratify the TTBT, but in a strongly expressed context that ratification is given with the full understanding that the TTBT is a step toward a comprehensive ban rather than a terminal objective in its own right.

The technical reason why a comprehensive test ban agreement would serve the cause of nonproliferation is, of course, the fact that nonnuclear nations could not with confidence develop a nuclear explosive without nuclear testing.

The LTBT of 1963 currently has more than 100 signatories, and it would be expected similarly that a comprehensive ban would be adhered to by a very large number of other nations.

Accordingly, a CTBT would constitute a direct limit on the number of nations which could acquire nuclear explosives.

Arguments Against CTBT

The previous remarks outline some of the main reasons for strongly supporting the thrust toward a CTBT. This committee has, of course, heard and will continue to hear arguments expressing the opposite point of view. The arguments tend to fall into four categories:

One, the possibility that the Soviets would cheat under a CTBT while the United States would not do so;

Two, the reliability of the U.S. nuclear weapons stock-

(See COMPREHENSIVE TEST BAN, Pg. 11-F)

pile could not be verified under a comprehensive ban;

Three, the U.S. weapons laboratories would deteriorate under a comprehensive ban, while the Soviet laboratories could be maintained by coercion to function effectively;

Four, a comprehensive ban would interfere with programs currently planned for certain U.S. military systems.

Let me comment on each of these four items briefly in turn.

Possible Evasion

There is no question that regardless of the progress which has been made in verification technology, to which previous witnesses have referred, it will always be possible for a determined evader to carry out a small number of tests at low yield that cannot be identified by national technical means alone. Onsite inspection offers very little incremental verification capability. However, some residual risk of detection always remains, even if technical verification means have not detected the violation.

It is exceedingly unlikely that results of such testing would be of substantial military significance. This conclusion is based upon some of my remarks made before about the maturity of nuclear weapons technology. As a result of this situation, the incentive to take the risk of evasion is very small, and the military consequences of evasion are minimal.

Stockpile Verification

As far as this argument is concerned, the committee should note that it has been amply demonstrated that stockpile verification can be carried out without benefit of nuclear testing.

On a longer time scale, there may well be a gradual deterioration of confidence which military planners have in the reliability of the nuclear weapons stockpile.

I believe on balance that this is a beneficial effect because it would tend to discourage preemptive strikes against the deterrent forces of the opponent. In contrast, the deterrent value of nuclear weapons is hardly affected by small decreases in reliability.

Weapons Laboratories

A frequently heard argument against a CTBT relates to the viability of the weapons laboratories. Indeed, in the absence of nuclear testing the viability of nuclear weapons laboratories would be downgraded in time.

However, I believe that this argument applies at least as much to the Soviet Union; the very essence of arms control is that the military R. & D. capability of all parties be impacted.

I do not believe in the assertion that the Soviet Union would be in a position under a CTBT to coerce highly productive weapons R. & D. while the United States would not. Creativity cannot be coerced.

In fact, wisely, the U.S. ERDA-supported weapons laboratories, namely Livermore and Los Alamos, have diversified their activity so that roughly half of their funding is now dedicated to direct energy-related programs. Some of the technology involved in such programs overlaps that of weapons technology. Moreover, the United States has facilities superior to those of the Soviet Union in the field of computation related to weapons design and in simulation of weapons phenomena.

Effect on Present Programs

The military impact of an arms control measure should be judged by a net assessment rather than simply by its effect upon planned U.S. programs. In this respect, I believe that on balance, a CTBT would be a net gain to U.S. security.